REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Office Action dated May 23, 2008. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

Claims 8-18 and 20-27 stand for consideration in this application. Claims 1-7 an 19 are being cancelled without prejudice or disclaimer. Claims 8-9, 16-18 and 20 are being amended to more particularly point out and distinctly claim the subject invention. New claims 21-27 are being added. All the amendments to the claims and the drawings are supported by the specification. Applicant hereby submits that no new matter is being introduced into the application through the submission of this response.

Prior Art Rejections

Claims 1-20 were rejected under 35 U.S.C. §103 (a) as being unpatentable over Miki et la. (US 2007/0110060) in view of the newly-cited Shen (US 6,907,039). This rejection has been carefully considered, but is most respectfully traversed.

The access router 500 (for example, Embodiment 2 depicted in Figs. 2-3 & 7-9) of the present invention, as recited in claim 21, is configured with an L2TP Network Server (LNS) function for terminating a plurality of L2TP tunnels (e.g., 751,-753 in Fig. 7) and an L2TP Access Concentrator (LAC) function for forming the plurality of L2TP tunnels and a plurality of virtual routers (e.g., VR1-VR3 in Fig. 7) ("*the LAC function is a function to form a L2TP tunnel in a L2TP transfer network, the LNS function is a function to terminate the L2TP tunnel formed by the LAC*" p. 9, lines 13-16), and each of the plurality of virtual routers includes at least one of a physical interface and a logical interface, and means for distributing a packet received at the physical or logical interface to another one of the plurality of virtual routers. The access router comprises: a plurality of physical interfaces each of which transmits or receives packets to/from an external communication line; and a memory which stores corresponding relationships (e.g., Fig. 8A) each defining among a physical interface identifier for identifying a physical interface, a logical interface identifier for identifying a logical interface, a kind of protocol of a received packet, a first virtual router identifier for identifying a first virtual router, a first packet processing action (e.g., Decap PPPoE,

Map_L2TP, etc.) to be executed on the received packet by the first virtual router, a second virtual router identifier for identifying the second virtual router designated to exclusively execute a second packet processing action which is different from first packet processing action, and also stores routing information (e.g., Fig. 8B; p. 24, last paragraph) for routing a packet. The logical interfaces are multiplexed on the physical interfaces. Each of the plurality of virtual routers functions as the first virtual router to distribute a received packet to the second virtual router which **exclusively** (p. 13, line 10; Fig. 8A) executes the second packet processing action on the received packet. The second virtual router exclusively executes the second packet processing action on the received packet based on one of the corresponding relationships including one physical interface identifier for identifying the physical interface having received the packet, one logical interface identifier for identifying the logical interface having received the packet, one kind of protocol category of the received packet, and then performs a routing processing with reference to the routing information and outputs the packet.

For example, as recited in new claims 22-23 and shown in Entry 2123 of Fig. 8A (e.g., Logical I/F Session_12 corresponds to PPP protocol and an Encap_L2TP processing implemented on the virtual router VR_0 then sent to the virtual router VR_1 for another procession), the access router performs the L2TP LAC function, the plurality of virtual routers includes a first virtual router which has a physical interface or a logical interface for transmitting/receiving the first packet via a PPP session with a user terminal, and a second virtual router which has a physical interface or a logical interface for transmitting/receiving the second packet and establishing an L2TP tunnel with the first virtual router thereby functioning as an L2TP LNS device, and the first virtual router encapsulates the first packet received via the PPP session into the second packet and send the second packet via the L2TP tunnel to the second virtual router as the first packet processing action, and distributes the second packet via the L2TP tunnel to the second virtual router.

As another example recited in new claims 24-25 and shown in Entry 2133 of Fig. 8A (e.g., Logical I/F UDP_1701 corresponds to UDP/IP protocol and an Encap_DDP/IP processing implemented on the virtual router VR_1 then sent to the virtual router VR_0 for another processing), the access router performs the L2TP LNS function, the plurality of virtual routers includes a first virtual router which has a physical interface or a logical interface for transmitting/receiving the first packet and establishing an L2TP tunnel thereby functioning as an L2TP LAC device, and a second virtual router which has a physical interface or a logical interface for transmitting/receiving the second packet from a backbone

network, the first packet is a IP packet, and the first virtual router establishes the L2TP tunnel and distributes the first packet via the L2TP tunnel to the second virtual router, and the second virtual router terminates the L2TP tunnel and decapsulates content encapsulated in the second packet via a PPP session as the second packet processing action.

The invention recited in Claim 8 is directed to an access router similar to the one recited in claim 21 by reciting a processor which executes predetermined processing on packets transmitted and received through a user terminal, and utilizes corresponding relationships (e.g., Fig. 8A) to support each of a plurality of virtual routers accommodated therein to perform routing actions independently from other virtual routers. In addition claim 8 recite a respective L2TP tunnel. The invention recited in Claim 18 is directed to a business method implemented via the access router of claim 8.

"*All function units except for the physical I/F processing unit 520 and SW unit 530 must be able to operate independently for each virtual router. Independent operation for each virtual router may be realized by a plurality of methods. For example, it may involves mounting the same number of independently operating processors as that of the virtual routers; using a common processor but running the same number of independent processes as that of the virtual router; or using a common processor and a common process but employing internal virtual router identifiers. In this configuration the method using the virtual router identifiers will be explained. In this case, mapping to virtual routers can be realized by marking individual packets with virtual router identifiers* (p. 10, last paragraph)".

L2TP transfer networks 651-653 are built independently of each other without having to be aware of the presence of one another. Since L2TP transfer networks need only be a simple IP network, a new service of "relaying L2TP tunnels", nonexistent so far and different from the access line providing service or ISP service of the prior art, can be set up. As such, an access line provider can connect to a plurality of relay carriers' networks 651-653 by using a single access router 500 (p. 16, 2nd paragraph). Other advantages of the present invention include (p. 20-21): The access router holds a plurality of routing information, the connection with a plurality of independent IP networks is made easy. The invention assigns the management authority over a LAC device to an access line provider/communication carrier for each virtual router realized in the access router, such that the access line provider may wholesale (transfer or assign the management authority over) any or all of the functions (claim 18). There is no need to ground different LAC routers for different service categories and only one access router of the present invention needs to be grounded. Since individual virtual routers cooperate with different authentication, authorization, and accounting (AAA)

servers respectively, the sessions accommodated in the entire device can be distributed to virtual routers.

Applicant respectfully contends that none of the cited prior art references teaches or suggests such "a virtual access router including a plurality of virtual routers each of which exclusively executes a predetermined packet processing as to a received packet and functions as the first virtual router to distribute the received packet to the second virtual router for another/different predetermined packet processing, based on one of the corresponding relationships each defining a physical interface, a logical interface and a kind of protocol of the received packet, such that the virtual router to which the packet is distributed exclusively executes a predetermined packet processing and a routing processing on the received packet" as in the present invention.

As admitted by the Examiner (p. 5, 3rd-6th paragraphs of the outstanding Office Action), Miki does not disclose "a plurality of virtual routers...", "a memory storing with the routing information...", etc. as does the present invention.

Shen was relied by the Examiner to provide the missing teachings. However, Shen's plurality of virtual routers VR-A, VR-B, VR-C merely pass a packet intended for a different virtual router as indicated in a destination field in the routing table ("*If VR-A 111 received a packet for transmission to VR-B 113, then the VR-A 111 looked up the next hop in its routing table, found an interface that was associated with the ingress port 103B, and forwarded the packet based on that interface*" col. 1, lines 43-47; "*The exterior gateway routing table 211 indicates routing information for reaching destinations external to the AS of the virtual router 205A*" col. 2, lines 63-65), rather than "exclusively executing a packet processing action on the received packet therein, and then transmitting the processed packet to another/different virtual router for exclusively executing another/different packet processing action thereon" as in the present invention. Shen simply fails to provide the ***packet-processing-action-driven forwarding scheme*** as in the present invention. Like the prior art routing table, Shen's routing table consists of the following information fields: (1) the destination id; (2) cost: i.e. the cost of the path through which the packet is to be sent; (3) next hop: next hop is the address of the next station to which the packet is to be sent on the way to its final destination; (4) line, metrics, etc. (col. 3, lines 15-23), but not "a first packet processing action (e.g., Decap_PPPoE, Map_L2TP, etc.) to be executed on the received packet by the first virtual router, a second virtual router identifier for identifying **the second virtual router designated to exclusively execute a second packet processing action which is different from first packet processing action**" as in the present invention.

Shen's inter-VR routing mechanism forwards a packet to an inter-VR next hop as indicated in the forwarding table (col. 4, lines 24-29; "*The terms "routing table" and "forwarding table" are used throughout the description, but are not limited to being tables. A routing table and a forwarding table may be implemented with a variety of data structures (e.g., trees, tries, linked lists, hash tables, hybrid data structures, etc.).*" col. 2, lines 40-44). However, Shen downloads such a table from a source without specifying how the inter-VR next hop is predetermined. Shen is just silent regarding forwarding a packet to a particuer virtual router for exclusively executing a predetermined packet processing thereon as in the present invention.

Applicant contends that the cited references or their combinations fail to teach or suggest each and every feature of the present invention as recited in independent claims 8, 18 and 21 and their dependent claims. As such, the present invention as now claimed is distinguishable and thereby allowable over the rejections raised in the Office Action. The withdrawal of the outstanding prior art rejections is in order, and is respectfully solicited.

Conclusion

In view of all the above, Applicant respectfully submits that certain clear and distinct differences as discussed exist between the present invention as now claimed and the prior art references upon which the rejections in the Office Action rely. These differences are more than sufficient that the present invention as now claimed would not have been anticipated nor rendered obvious given the prior art. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application as amended is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the

prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicant's undersigned representative at the address and telephone number indicated below.

Respectfully submitted,

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August 22, 2008

SPF/JCM/JT